

II. The World of Interactive Services

A. Introduction	24
B. Enhanced Television	27
C. Internet Over TV	29
D. Video-on-Demand	32
E. Market Awareness of ITV Services	34
F. Market Perception of ITV Companies	35

Prospects for Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising Experience

The Global Outlook

A. Introduction

The biggest development recently to hit the interactive market is the proposed merger of America Online and Time Warner. The announcement has spurred broad speculation about the effect on the future of digital convergence. As Jim Louderback of ZDTV commented at the Myers Forum for Interactive Television Development in February, the merger announcement "really was where the internet took its place at the media table as an equal with television and newspapers and radio, and all other media out there." Ashley Dunn wrote in the Los Angeles Times that "the biggest force in the coming year may not be the combined AOL Time Warner itself, but rather the fear of a combined AOL Time Warner."

Respondents to the Myers ITV Survey were asked to write in their opinion of the merger and the comments were overwhelmingly positive, with most seeing the merger as a boost for ITV.

Interactive television encompasses a broad array of services, some of which are likely to work in tandem to provide a new viewer experience. Donaldson, Lufkin & Jenrette, which has been tracking the ITV market, foresees ultimately a combination of a portal that will act as an on-screen "home page" and offer links to:

1. An interactive program guide that will let viewers search for programs, set program reminders and record shows
2. A fully functional internet web browser
3. A walled garden of local information and services
4. Enhanced television
5. eCommerce linked to particular programs and advertisements
6. Interactive home banking and brokerage services
7. Interactive video games
8. eMail and instant messaging
9. Other services to be determined, such as remote control of appliances

Three broad categories of services currently dominate interactive television activity. Each category is addressed in the pages that follow, including companies involved (in bold). Due to the large and increasing number of companies, there no doubt have been some that have inadvertently and regrettably been omitted. The information about companies listed in this report is as current as possible, effective 1 May 2000.

Enhanced Television—Interactive program guides, on-screen content enhancements, requests for information, t-commerce

Internet over TV—Websites on TV, channel hyperlinking, e-mail, e-commerce

Video-on-Demand—Movies, events on demand with VCR functionality, subscription VOD, personal video recorders, digital video downloads

Slicing the ITV Market

The ITV market is amorphous and there are many ways to view it. During Myers' ITV Forum, Michael Collette, SVP of marketing for ICTV, offered his company's perceptions.

Broadcast TV	Cable Nets, Broadcast Nets, Local Nets
Enhanced TV	Interactive Graphics, Ads, eCommerce, Limited Content
Internet on TV	Surf on TV, eMail
Broadband Content	Bband, Interactive Content, Broadband Internet, Local IP Content, PC Games
Demand Content	Traditional Media distributed locally, Video on Demand, Music on Demand

Source: ICTV

The Yankee Group provides the following market breakdown.

ITV Today Covers a Range of Services and Companies

Service	Features and Functions	Key Players
Interactive Program Guides (IPGs)	<ul style="list-style-type: none"> ■ One-touch access and scheduling ■ Personalized channels 	Gemstar, Interactive Channel
Digital Video Recorders	<ul style="list-style-type: none"> ■ Live pause and rewind recording ■ Personalized channels 	Replay Networks, TiVo
Enhanced TV Services	<ul style="list-style-type: none"> ■ Complementary data ■ Updated news & info. ■ TV-based orders and commerce 	WebTV, Wink
TV-based Web Access	<ul style="list-style-type: none"> ■ Web browsing, eMail, eCommerce 	WebTV, WorldGate
Video-on-Demand Recorders	<ul style="list-style-type: none"> ■ Movies, Video, Music, commerce 	DIVA, Oracle, iMagicTV, Intertainer
ITV Platforms	<ul style="list-style-type: none"> ■ Tools and platforms for other applications 	Liberate Technologies, Microsoft, OpenTV

Source: The Yankee Group

Prospects for Interactive Television

The World of
Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

More Players, Lower Odds

Will the ITV market be able to sustain all of the players that are entering it? The renewed promise of ITV is sure to draw more market entrants, but the odds are against all of them realizing their ambitions.

The winners are likely to be those with:

- Deep investment pockets to sustain slow initial rollout
- The ability to substantially capitalize on revenues from subscription, advertising or e-commerce, or all of those
- The ability to make sales propositions easy for consumers or advertisers
- Strong partnerships with major distributors (cable operators, broadcasters, online services, e.g.)
- Easy access and reasonable costs for content
- Patented intellectual property
- A technology that is easy for distributors and users to implement and maintain
- A compelling viewing experience that gives consumers choice, convenience and control

The number of ITV players will continue to expand and be joined by startups, traditional media players and online companies that are eager to serve the TV as well as the PC once greater broadband distribution rollouts are achieved. AOL Time Warner will have a major impact on the shape of the market. Its developments will prompt activities by media allies as well as competitors, all of which will increase the level of ITV business activity.

By late 2001 to early 2002, some players are likely to disappear through attrition and mergers and acquisitions. By that time, digital platform rollouts will have reached a point that ITV providers will have sufficient distribution agreements in hand (or not) and many will have seen the initial realization of their business models (or not).

The market already is seeing merger and acquisition activity on the software side. In the past several months, deals were announced in which OpenTV is acquiring Spyglass for \$2.5 billion in stock; Liberate Technologies is buying MoreCom for \$561 million in newly issued stock; Microsoft is buying Peach Networks, terms not announced; and PowerTV is merging applications provider Prasara into its company.

Of course, much also depends on the stock market and investors' willingness to support new media.

Although Myers has established these benchmark forecasts for evaluation and tracking purposes, it would be inappropriate for users to depend upon them for uses other than tracking. It is difficult to project ITV revenues since the industry is in such nascent form and revenue models are uncertain. Myers anticipates publishing future forecasts that will more clearly define internet/online and ITV revenues.

Other forecasts vary in the actual numbers projected, but they all see strong growth. Paul Kagan Associates estimates that interactive advertising revenues alone will pass the \$5 billion level by 2004, indicating a growth rate nearly equal to that of the internet, but surpassing cable, broadcast TV or radio. Jupiter Communications foresees an ITV market (which Jupiter describes as "a hybrid of web and television revenue and programming models") of \$10 billion in revenues by 2004.

According to analysis by eMarketer, Forrester Research predicts ITV revenues of more than \$15 billion by 2004, about two-thirds from enhanced broadcast TV and one-third from web-on-TV services. Forrester cut back its earlier projection of total ITV 2004 revenues of \$20 billion, including shaving its advertising revenue projection to \$7.7 billion from \$11 billion. Based upon new projections in November 1999, the following table shows how Forrester sees ITV revenue breaking down.

**Interactive TV Revenues, 1999–2004,
in Millions of Dollars**

Revenue Source	1999	2000	2001	2002	2003	2004
Advertising	\$94	\$212	\$535	\$1,805	\$4,470	\$7,723
eCommerce	\$168	\$621	\$1,561	\$2,639	\$4,071	\$5,754
Subscriptions	\$403	\$822	\$1,413	\$1,550	\$1,721	\$1,912
Total	\$665	\$1,665	\$3,509	\$5,994	\$10,262	\$15,389

Source: Forrester Communications, 1999

Prospects for
Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

D. Revenue Potential for ITV Services

Video-on-demand (VOD) has leapt into the lead as the top potential ITV revenue producer after placing third among ITV services in last fall's Myers survey. Interest in e-commerce and interactive advertising, which placed one-two last fall, remains strong.

Revenue Potential for ITV Services

% of respondents ranking revenue potential as high*

Video-on-Demand

75.0%

E-Commerce

61.7%

Interactive Advertising

53.3%

On-demand time shifted programs

41.7%

News & Information

38.3%

Interactive games

36.7%

Personal video recorders

33.3%

Interactive TV guides

30.0%

Video streaming on the Web

23.3%

Interactive elements in TV shows

20.0%

Enhanced broadcasting

20.0%

*A ranking of a 6 or 7 on a 7-point scale.

Source: Myers Group, Prospects for ITV, 2000

The cable industry has taken renewed interest in on-demand movies, partly in response to satellite competition and partly due to lower costs-per-stream that are making scalable deployment attainable. At the Myers Forum for Interactive Television Development, Robert Rosentel, VP of new media for Cablevision Systems, said the driving forces for Cablevision's customers are VOD and electronic program guides. The reason: "Customers understand what it is." Cablevision's research shows "customers are not as interested in the internet on TV as some people think."

Only 15% of survey respondents felt that revenue potential for internet on TV was high, not enough to place it within the top 10 responses. That's surprising considering that many define internet over TV as a key ITV category. Much of the low response may have to do with the state of the internet today, which provides a rather static TV experience, and the fact that services like WebTV so far have not enjoyed high mass market popularity. All that may change as media streaming enhances video and audio web capabilities that can be distributed to the TV through broadband technology. Major players like WebTV and AOL TV can drive demand by providing interactive services that straddle the web and TV experience. Gary Lauder of ICTV believes demand will evolve because "all of these dot-coms are driving a lot of people, who don't today have internet access, to want it. It's not the issue that they want to do it on their TV, but that they want to do it."

ITV Advertising: Devil's In The Details

The advertising community, having seen the allure of e-commerce on the web, is taking a keen interest in ITV. But the parameters of an advertising business model are still largely unclear.

Panelists at the Myers ITV Forum agreed that, with the exception of a VOD service like movies-on-demand, an advertising-supported model would win out over subscription-based revenue models. As Robert Rosentel of Cablevision Systems put it, "One of the important things to think about is how these businesses evolve as personalized advertising. Targeted information to people that is of genuine interest to them is really a fundamental change for the advertising business."

Providing more targeted audiences could lead to higher cost-per-thousand prices for interactive advertising than traditional broadcast. Yet advertisers will have to be convinced of the value of an interactive advertisement before they're willing to pay a premium. In addition to ITV's targeting capabilities, media executives foresee other incremental value enhancements, including data mining of consumer information, direct marketing, sweepstakes and other promotions, couponing, and localized components (such as a car ad with an interactive tie-in to a local dealer). How advertisers are able to take advantage of the feedback on the viewer that is stored in interactive systems remains to be seen.

Clearly, advertisers, agencies and marketers are eager to embrace interactive advertising opportunities. Based upon Myers survey research:

- 92% of advertising executives consider opportunities to explore technology-based advertising opportunities such as WebTV to be important to them today
 - 70% of marketing executives place high levels of value on convergence marketing opportunities
 - 61% of advertising executives consider ITV to be of significant value to their companies in the next 48 months
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Prospects for
Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

E. Obstacles to ITV

Despite a high level of activity surrounding ITV, many observers find there are still significant obstacles to overcome. Nearly half of the survey respondents found lack of technical standards, incompatible platforms and lack of industry agreement to be the major roadblocks in the growth potential for ITV.

The ITV arena is becoming more populated each day with unique technologies and applications but there's no clear industry-wide consensus on a central, ubiquitous platform to distribute them all. The current, limited capability to deliver interactive television to the consumers is a direct result of these obstacles. These obstacles also have prevented participation by advertisers, broadcasters, cable operators and others on a wide scale.

Biggest Obstacles to ITV

% of respondents ranking obstacles as high***Lack of technical standards****46.7%****Incompatible platforms****45.0%****Lack of industry agreement****45.0%****Unproven business models****31.7%****Lack of distribution****28.3%****Regulatory issues****21.7%****Inefficient or unaffordable technology****18.3%****Lack of research****11.7%**

*A ranking of a 6 or 7 on a 7-point scale.

Source: Myers Group, Prospects for ITV, 2000

While the lack of standardization is a problem for ITV developers and distributors, it is becoming an increasing annoyance for TV networks and other content providers. Most TV programmers have been willing to enter agreements to adapt content for ITV services, yet some are having to accommodate as many as 10-12 different platforms. Jim Louderback of ZDTV says "we still have to come to grips with how you develop content you can deploy on the internet, on television, and on these integrated boxes."

"One of the reasons that standards have become an issue is because of the question of how do you take the content that you've already developed for one platform and use it on another platform?"

— Beth Loughney, OpenTV

There are efforts to overcome these obstacles. Among recent activities:

- The FCC is working with the cable industry and TV manufacturers to determine standards needed to bring cable-compatible DTV sets to the market that would include a firewire connection necessary for two-way interactive services;
- Cable operators continue to roll out advanced digital set-tops that can provide a broadband platform for ITV services; eventually, boxes will include cable modems for high-speed Internet access. The major manufacturers—Motorola, Scientific-Atlanta and Pioneer—have substantially increased production of digital set-top boxes to meet the demand of cable systems upgrading to allow two-way data transfer;
- The Advanced Television Systems Committee of 200 broadcast and TV equipment manufacturers intends to make recommendations by the end of 2000 on the digital TV technical standards;
- Matsushita Electric Industrial Co. and OpenTV recently announced an alliance to develop hardware and software to strengthen the Multimedia Home Platform (based on Java technology being created by a group of 265 companies involved in the framework for the development of DTV), including specifications for interactive television.

Searching For ITV's Savior

Most ITV observers recognize that the industry is unlikely to fully succeed without an open technological platform and standards that can be used by multiple service providers. Yet the ability to create an industry consensus is difficult when there are many different players, each with their own visions, business strategies and profit motives.

Much will depend on ongoing consensus building efforts by such organizations as the Advanced Television Enhancement Forum (ATVEF), CableLab's OpenCable project and the Federal Communications Commission. Many of the efforts to standardize the delivery of digital television will have a major bearing on ITV. But building consensus can be a long, painstaking process.

As with many nascent industries, a single, dominant company or technology could provide a de facto standard that drives the entire business. When Microsoft Corp. purchased WebTV, many observers believed—and competitors feared—that Microsoft was on its way toward dictating the future of ITV. That hasn't happened, to the relief of competitors, but it has left ITV without the type of breakthrough market force that a Microsoft can provide. Microsoft's aspirations remain high, however, and its influence and contributions will continue to impact future ITV developments.

Many analysts foresee the America Online-Time Warner combination as a driving force for interactive media. Executives of the companies have pledged an allegiance to open platforms. The merged companies could spur ITV development by serving as a shepherd for the ITV flock, and by becoming a powerful inducement by competitors to seek to counter its potential dominance.

Prospects for
Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

F. Greatest Potential Beneficiaries

Nearly 70% of those surveyed believe cable operators will reap the greatest benefits from ITV, almost double the results of last fall's Myers survey.

The improved status for operators comes amid announcements by major cable companies to roll out more digital set-tops and embrace broadband technologies.

Content creators, the leaders in last fall's Myers survey, are still viewed as major beneficiaries. Placing third are internet/web companies, even though respondents do not think highly of the revenue potential of internet-over-TV services. Satellite companies more than doubled their fall percentage of 12.9%, which could be due to recent announcements by broadcast services to add enhanced or internet-oriented services.

Theoretically, survey participants could give high marks to the industry in which they work, but the results do not suggest respondents were rooting for their home team. Among the respondents were advertisers/agencies (28% of respondent base), internet/web companies (17%), cable networks (20%), cable operators (13%), content creators (7%), financial institutions (5%), broadcast networks (3%) and broadcast TV stations (3%).

Greatest Beneficiaries of ITV

% of respondents giving high rankings for media players*

Cable operators
68.3%
Content creators
56.7%
Internet/web companies
46.7%
Satellite companies
35.0%
Hardware providers
33.3%
Advertisers/agencies
31.7%
Computer software companies
28.3%
Cable networks
25.0%
Consumer electronics companies
23.3%

*A ranking of a 6 or 7 on a 7-point scale.

Source: Myers Group, Prospects for ITV, 2000

Don't Count Out Broadcasters

Conspicuously absent from the list of greatest ITV beneficiaries are broadcasters, who were listed on the survey but received only 15% high ratings (a 6 or 7 on a 7-point scale). For the second Myers ITV survey in a row, respondents left the broadcasting industry virtually off the charts. Why this lack of faith in the American broadcasting system?

The results could be partly attributable to a low number of broadcasters in the respondent base. Yet broadcasters will be disheartened to know that other major respondent groups, especially advertisers, give far more credence to the cable industry than broadcasting.

The result also could be partly attributable to timing. When the survey was first distributed at the Myers ITV Forum on 1 Feb., little was known publicly about specific digital plans. Though more than 100 stations are now digitally equipped, high-definition TV is rolling out very slowly and the industry is divided over whether digital standards need to be reworked. The day after the ITV Forum, during a forum co-sponsored by Myers and Bear Stearns, representatives of several major station groups revealed plans for broadcast applications using their digital spectrum. Public announcements soon followed. While most of the planned services are internet-oriented and do not fit a strict definition of ITV, their place in the digital media market cannot be ignored.

Making the biggest splash is iBlast, which will use broadcasters' digital spectrum and wireless antennas to provide over-the-air high-speed internet access and content services at what it claims are "guaranteed speeds" of more than five times that of DSL or cable modems. It counts agreements with 143 local stations owned by 12 major groups, including Tribune Company, Gannett and Cox.

Emmis Communications is leading another consortium of broadcasters developing internet strategies, including a portal for the radio industry. Among the service providers looking to marry broadcasting and the internet in various ways are Internet Broadcasting Systems, Geocast, MicroCast, WorldNow and Zatso, the latter aimed at leveraging stations' news capabilities. Capitol Broadcasting also is experimenting with digital applications and has formed Local TV On Satellite, which will seamlessly provide local TV stations for DirecTV and EchoStar subscribers along with enhancements such as local news and weather.

Another unique new application for interactivity is offered by DigitalConvergence.com, which markets software that enables TV stations to send information directly to PCs at the sound of a tone played during an interactive TV ad or program.

Prospects for
Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

Survey Methodology

The Prospects for Interactive Television Survey was distributed to attendees of The Myers Forum For Interactive Television Development, held 1 February 2000 in New York. The forum was attended by approximately 450 senior-level executives from an array of media-oriented businesses, including advertisers, advertising agencies, cable networks, cable operating companies, broadcast networks, local TV stations, content creators and financial institutions. The three-page written survey was completed by 60 individuals. Some respondents completed it during the forum while others submitted it to Myers afterward. The survey asked respondents: to rate the potential for ITV based upon scales of 1-7, with 1 being low and 7 being high; check boxes to provide their estimates of future ITV users and revenues; and rate individually named ITV services in yes/no questions. A similar survey was conducted during a Myers ITV Forum in September 1999 and additional surveys will be conducted in the future.

II. The World of Interactive Services

A. Introduction	24
B. Enhanced Television	27
C. Internet Over TV	29
D. Video-on-Demand.....	32
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Prospects for Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising Experience

The Global Outlook

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Prospects for Interactive Television

The World of
Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

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Of course, much also depends on the stock market and investors' willingness to support new media.

B. Enhanced Television

Enhanced television includes a variety of applications in which viewers use their remote to access additional content that adds to the on-screen programming, usually in text form.

Electronic program guides represent one of the primary ways of creating viewer interaction. On-screen EPGs being provided by DirecTV and some cable operators enable viewers to click through program grids. Such guide capabilities have scored highly in consumer research and have been a well-regarded feature of direct-broadcast satellite and digital cable. Products that truly deserve the label of interactive program guide offer greater customization, such as the ability to sort by program genres, access favorite programs or select programs for video recording.

The interactive guide field is expected to be dominated by the merged Gemstar and TV Guide Inc. (the deal is expected to close about the end of June). **TV Guide Interactive**, a digital sister service of the analog TV Guide Channel, is in about 3.2 million homes and the company expects to have nearly 6 million by year's end, mostly on AT&T BIS cable systems. It's also testing a combination of TVGI and SeaChange's video-on-demand technology.

Despite TV Guide's strong position, others are seeking to provide guides, either on screen, through guides imbedded in set-tops or TVs, or through the web. Tribune Media Services, which provides TV listings through newspapers, is entering the interactive guide field through a service called **Zap2it**. Diva, a VOD provider, is also offering a guide. **Source Media** provides an interactive program guide and additional localized information.

Prospects for Interactive Television

The World of
Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

AOL Merger Creates Convergence Chic

The AOL Time Warner merger will provide the company with a customer base that is ready and willing to explore new interactive services. A joint study by Greenfield Online and The Myers Group found that AOL customers had a higher level of interest than non-AOLers in high-speed access, movie/TV downloads, internet on TV and TV via the computer. The study, conducted in January shortly after the merger announcement, found:

- 1 of 4 internet users are AOL subscribers
- One-half of AOL subs expect the merger to have no effect on customer service
- 1 of 4 AOL subscribers feel the cost of service will rise
- 80% of non-AOL users do not plan to sign up for AOL
- Younger consumers—under 35—showed significant interest in potential media services that AOL Time Warner would be able to offer
- 75% of all those surveyed chose high-speed access as the most desirable service
- 84% of more affluent users are interested in high-speed access

AOL's Importance to Convergence

Percent of consumers expressing high interest in:

High speed access**Movies/TV download****Internet via TV****TV via computer**

■ AOL Subscriber
■ Non-AOL

Source: Myers/Greenfield

Other enhanced television applications include the ability to click for sports statistics, movie information, additional news content, etc.

The Interactive Channel, owned principally by Source Media and carried on some Insight Communications cable systems, has focused on localized on-demand information and e-mail. ITV services with revenue potential include request-for-information (RFI) applications, allowing viewers to order information, samples and coupons when viewing commercials enhanced for interactivity, and t-commerce (a bastardized label for e-commerce) or DRTV (direct-response TV), allowing for more direct product sales.

“The consumer has been ready for some time for this. The question is: can people deliver it at a reasonable price?”

—John Carey, Greystone Communications

Wink Communications is a current front-runner in RFI-type content. In households where Wink is available, a Wink icon alerts the viewer that more information is available, either in programs and commercials, and to click to receive that information. Wink receives about \$1.50 per RFI and 12% of transaction revenues, according to DLJ. Procter and Gamble, AT&T, and Charles Schwab are among the major advertisers who are trying out Wink features in commercials. In April, Wink reported it has launched in more than 175,000 cable households and it expects a total of 750,000 by the end of the third quarter. Recently Wink has been engaged in an effort to promote ITV usage and advertising effectiveness measures.

Another company seeking to capitalize on interactive advertising is RespondTV, which provides hosting and development for advertisers, programmers and distributors. Through a trigger inside a regular video signal, any TV or set-top box (with ATVEF standards) can display RespondTV's interactive overlays. RespondTV charter advertisers include Nissan, Domino's Pizza, E-Loan and CondeNet's Epicurious. RespondTV is also selling software services to enable programmers to monitor and control enhanced content so that their digital spectrum is not “tagged” with enhancements without their knowledge. Another company taking a swipe at t-commerce is Commerce.TV, which provides an onscreen ordering interface.

Meanwhile, television programmers have been experimenting with interactive elements in a variety of ways. Game Show Network, a strong believer in ITV, recently told advertisers during an upfront presentation that it has been compiling a consumer data mine on interactivity through the information that GSN is required to collect from viewers who want to play along at home with its on-air games.

C. Internet Over TV

Surfing the web on TV initially appeared as an attractive concept but so far the idea has lost something in practice. Only 15% of the Myers survey respondents felt that internet over TV offers high revenue potential.

Studies provide contradictory evidence as to how much people want to surf the web over their TVs. Some show that users are most comfortable when the TV and the PC are both on, while others suggest that the passive “lean-back” nature of TV will mix well with the “lean-forward” web surfing experience. Currently, the relatively static, text-based nature of websites lose much of their appeal when placed on a large TV set.

Yet all that is about to change as broadband streaming technologies take hold and major players such as AOL Time Warner and Microsoft Corp. seek to capitalize on digital convergence.

Prospects for Interactive Television

The World of Interactive Services

The ITV Rollout

The Interactive Advertising Experience

The Global Outlook

AOL has plans to launch its AOL TV service this summer. The company promises to bring its online e-mail, web surfing, chat and instant messaging services to television screens. Using Time Warner's cable holdings as a distribution platform, many analysts expect that AOL TV's interface will shape the look and feel of other emerging systems as the service of choice among consumers. The service also will add digital video recording capabilities through a joint venture with TiVo and Liberate Technologies. Liberate will provide the software platform and TiVo will provide the digital video recorder.

Microsoft has long harbored ambitions of being the leading ITV platform provider. Its WebTV already is the leader in internet over TV with more than 1 million subscribers paying a monthly fee for access to the web. The service has broadened its array of interactive products and distribution outlets. For example, EchoStar's Dish Network set-top boxes will house a WebTV Plus terminal giving viewers access to online banking, shopping and programming storage on a hard drive.

Excite@Home is planning to enter the field later this year with @Home TV, described as a suite of high-speed interactive services, including e-mail and interactive advertising, for TVs. According to Forbes magazine, another major portal, Lycos, is entertaining thoughts of launching an interactive service called Lightning later this year.

ITV Platform Providers Crowd Stage

Several major players of ITV platforms are jockeying for position and diversifying their software in order to be able to provide a broader range of services to a broader range of distributors. Here are some of the major companies in this area and some recent moves:

- Microsoft recently announced the purchase of Peach Networks, enabling it to offer a WebTV platform to distributors who have not yet adopted advanced digital set-tops
- ICTV announced in November a new headend-based digital platform for high-speed internet access and broadband content for digital cable
- OpenTV, currently in 6 million set-top boxes worldwide, recently announced the purchase of Spyglass Inc., which licenses internet-access software and provides technology for wireless applications
- Liberate Technologies announced the purchase of MoreCom, a provider of software that enables delivery of interactive services via satellite and cable
- PowerTV, a Scientific-Atlanta subsidiary that has an operating system for digital set-tops and internet-leveraged platform for applications, is merging ITV applications provider Prasara into its operation
- Sun Microsystems is pushing its Java TV software as a standard application environment for digital TV

Joining the software fray is another major player, Canal+ Technologies, based in Paris. It's primarily a provider of middleware for digital and interactive applications. Its software currently is deployed in more than 6 million set-tops internationally and it recently announced its intentions to step up activities in the U.S. market.

Another player in the field is WorldGate Communications, which provides Internet over cable for a monthly subscriber fee. It uses Channel HyperLinking to link a program or commercial to that content provider's web site. WorldGate's service is delivered from headend servers and takes up little room on the set-top box. WorldGate and Nielsen recently released research, backed by advertisers General Motors, Kraft, Sprint and Warner-Lambert, showing 22% of hyperlink users said they are more likely to interact during commercials, versus 15% each for sports and sitcoms.

Another new product is HyperTV developed by ACTV, a longtime ITV player that has made its mark principally by providing camera angles and other enhancements for sports events. HyperTV streams data to a PC that gets synchronized to a TV program, thus providing digital convergence applications for cable TV.

Others are trying to break into the field with software solutions for both cable and telephone companies, including FutureTV and iMagicTV, the latter of which is promoting delivery of internet access and pay-per-view programming using ADSL technology over telco copper lines.

Hyperlinks in television programming and even in commercials can be a double-edged sword for advertisers. Some TV programmers see hyperlinking as one more way for the viewer to leave TV and surf the internet. Despite the audience movement, some commercial broadcasters see a potential to generate additional revenues with the new technology.

Meanwhile, cable programmers are seeking to build bridges between their cable networks and websites. One of the more natural outlets for such convergence is ZDTV, a 24-hour cable channel dedicated to computing, the Internet and related technology. Using its web site to drive viewers to the cable channel and using the cable channel to drive people to the web site, ZDTV uses interactivity to create audience for its internet fare and cable programming. Through its Netcam network, viewers can participate in their shows as if they were in the studio.

Broadband growth eventually will provide greater opportunity to bring high-resolution, full-motion, interactive video from the web to the TV screen. This digital convergence will further blur the lines between the PC and TV while providing bold new options for content providers, distributors, advertisers and consumers.

Prospects for Interactive Television

The World of
Interactive Services

The ITV Rollout

The Interactive Advertising
Experience

The Global Outlook

D. Video-on-Demand

VOD enables the ordering of programming for viewing when the viewer wants to see it, not on a set schedule. The decrease in the price of storage and video streaming, along with the continued upgrading of cable systems and advanced digital set-top boxes, is making VOD more of a reality.

For cable operators, VOD provides a strong counter to direct-broadcast satellite services, which currently provide far more pay-per-view hit movie start times than most cable systems. At a recent cable conference, AT&T Broadband CEO Dan Somers stated, "Video-on-demand is our opportunity to absolutely stop DBS."

Time Warner pioneered full-motion VOD during its Full Service Network trial in Orlando, Fla. in the mid-90s and found VOD to be a killer ap. The FSN service, rolled out to 4,000 subscribers, provided virtual VCR functionality, enabling viewers to order, play, pause and rewind movies as well as skip through in 10-minute intervals. While the company has kept the results of FSN private, executives publicly stated that the VOD service increased buy rates two to three times over traditional pay-per-view.

"Ah, the big challenge—what's the challenge? And it comes out of all this research: It's content. It's having good dynamic content. People don't necessarily want to or have to be pushing buttons all the time. Video-on-demand is simply you go to a menu, pick out a movie, and you watch it for two hours. So you could have very low levels of interactivity and very high levels of interactivity. And there is an audience across this spectrum."

—John Carey, Greystone Communications

Time Warner Cable currently is rolling out VOD in several markets while Diva Systems Corp., a full-service VOD provider, is offering service in various markets of cable affiliates. Among other suppliers of VOD content are In Demand, TVN Entertainment and Prasara, while those providing technology include Seachange International, nCube, Concurrent Computer Corp. (which last year acquired Vivid Technologies), Oracle Corp. and Unisys.

Intertainer is seeking to serve both the PC and TV markets by using high-speed phone or digital cable connections, via software in Motorola DCT 5000 or Scientific-Atlanta Explorer 2000 set-tops. Intertainer offers VOD movies, music and other interactive services and recommends content based on viewer preferences. Earlier this year, Microsoft announced it will invest \$56 million in Intertainer.

Personal video recorders can be considered VOD in that they allow for storage of programming for on-demand playback. TiVo and Replay Networks are the two manufacturers of PVRs (estimates of 33,000 recorders sold for 1999) offering this service. Both services are seeking to alleviate advertiser fears that they will be used to bypass commercials and to enlist advertisers in sponsorships. PVRs and digital download services are limited by the capacity of hard drives, which currently can store about 28-30 hours of programming, but they will be able to take advantage of expanded storage capabilities coming onto the market. On satellite, DirecTV is incorporating TiVo into its satellite receivers while Echostar has added PVR capability to its DishPlayer package, which also offers WebTV Plus.

The View From Capitol Hill

Interactive TV may be subject to many of the rules and regulations of the internet.

In a keynote address at Myers ITV Forum, Congressman Rick Boucher told the audience, "Convergence of the television set with the computer is soon going to enable a broad array of new services for viewers."

Activity has increased in Congress along with growth in membership of the House Internet Caucus. The goal is to "try to find better ways in which federal policy can promote the growth and development of the internet."

Boucher believes the "internet will become the medium of choice for the delivery of everything ...it truly is the internet through which interactive television will come of age."

Boucher outlined issues currently being addressed by the caucus:

- The promotion of deployment of broadband architectures into homes and businesses nationwide
 - The subject of privacy and the concern on the part of Americans that their Internet experience is vulnerable
 - The question of open access for internet service providers
 - Giving legal voice to ISPs to protect their facilities from spam
 - Whether the cable compulsory license will be available for multi-channel video and video-streaming on the internet
 - Congressional authorization of digital signatures for all commercial transactions cross the internet
 - The proper taxing environment for the internet
 - Addressing the so-called digital divide between those with and those without internet access capabilities
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Interactive Services

The ITV Rollout

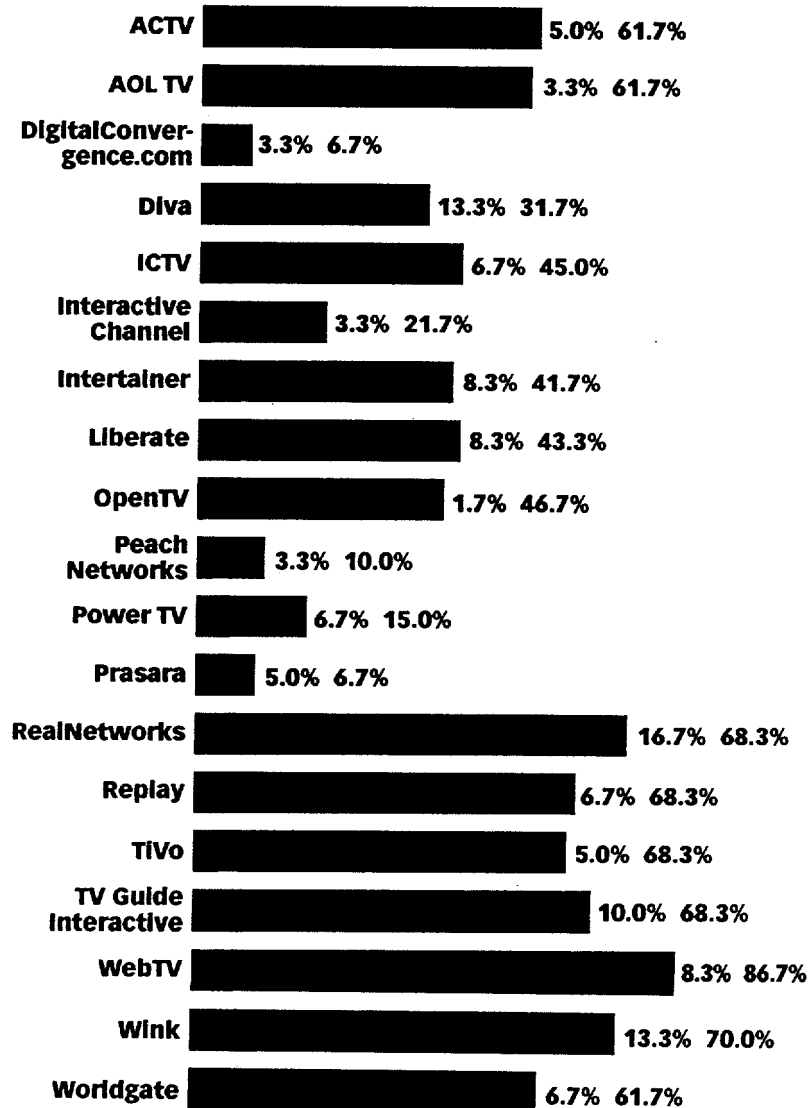
The Interactive Advertising
Experience

The Global Outlook

E. Market Awareness of ITV Services

Myers' ITV survey of 60 top media executives provides a measure of the media market's familiarity with various service providers. Respondents show great awareness of more established interactive services such as WebTV and Wink, but a fairly low level of business involvement at this stage. The list of surveyed companies is by no means all-inclusive, especially since new players continue to crop up, and it contains a couple players (DigitalConvergence.com, RealNetworks) that do not fit within the current ITV definition. The list is primarily comprised of established applications providers and companies that demonstrated at the Myers ITV Forum.

Market Awareness of ITV Services



■ Do Business With ■ Awareness of company's technology

Source: Myers Group, Prospects for ITV, 2000

F. Market Perception of ITV Companies

Are ITV companies friends or foes of the rest of the media market? Survey respondents were asked to check yes/no boxes as to whether they regarded each company as an opportunity or as a competitor. Many are regarded as business opportunities and few are viewed as competitors. Company totals that do not equal 100% mean that a percentage of the 60 respondents did not check off a box for that company.

Market Perception of ITV Services

	Consider Company/ Product An Opportunity?		Consider Company/ Product A Competitor?	
	Yes	No	Yes	No
ACTV	45%	6.7%	8.3%	18.3%
AOL TV	50%	5.0%	18.3%	18.3%
Digital Convergence.Com	5%	--	1.7%	6.7%
Diva	21.7%	6.7%	5.0%	10.0%
ICTV	31.7%	--	3.3%	11.7%
Interactive Channel	10.0%	6.7%	1.7%	8.3%
Intertainer	30.0%	3.3%	5.0%	15.0%
Liberate	25.0%	5.0%	8.3%	11.7%
OpenTV	23.3%	3.3%	5.0%	16.7%
Peach networks	6.7%	3.3%	6.7%	--
PowerTV	6.7%	3.3%	3.3%	1.7%
Prasara	3.3%	1.7%	--	5.0%
RealNetworks	46.7%	3.3%	11.7%	23.3%
Replay	36.7%	10.0%	11.7%	23.3%
TiVo	35.0%	15.0%	13.3%	23.3%
TV Guide Interactive	43.3%	10.0%	6.7%	25.0%
WebTV	53.3%	13.3%	20.0%	23.3%
Wink	46.7%	5.0%	10.0%	21.7%
Worldgate	43.3%	3.3%	8.3%	16.7%

Source: Myers Group, Prospects for ITV, 2000

